5   **TITLE**

Advertisement Subgroups for Digital Streams

This application claims the priority under 35 U.S.C. § 119
of U. S. Provisional Application 60/133,398 filed on May 10,

10   1999. Application 60/133,398 is herein incorporated by
reference, but is not admitted to be prior art.

Background of the Invention

The development of compression and transmission techniques

15   for digital video and audio signals coupled with the advent of
the Internet have resulted in an ability to transmit audio and
video programming to subscribers from a multitude of locations.
Reception areas are no longer limited to the reception area of
a radio or television transmitting tower, a cable TV head end,

20   a telephone central office or another geographically determined
location. Instead, the subscribers of programming may be
distributed over a wide geographical range and in fact exist in
a multitude of countries.

For example, a group of subscribers distributed across the

25   globe having a specific interest can have simultaneous access
to the programming of interest. In cable television systems,
these programs are generally transmitted to groups of
subscribers, each group being associated with a node. A node
is traditionally associated with a receiver which receives an

30   optical signal from the cable TV head end, converts the signal
to an electrical signal, and transmits the signals to the
homes. The video programming is frequently transmitted from
one central location to multiple cable television head ends,
and then distributed to the nodes and ultimately to the

35   subscribers. Although the viewership for the programs
transmitted in this manner may be quite large, generally, there

5   exists characteristics that can be associated with each node
    due to the respective geographic location.

        The nodes in certain areas may have subscribers with a
    particular range of household income or other demographic
    characteristics that are distinct from the subscribers in other
10 nodes both nearby and distant.

        Similar characteristics exist for the television systems
    that receive digital programming from satellites. Generally,
    the digital video programming is frequently transmitted from
    one central location to multiple cable television head ends,
15 and then distributed to the nodes and ultimately to the
    subscribers.

        The transmission of the programming based on specific
    geographic areas continues to exist, especially in cable-based
    systems and satellite-based systems, but is substantially
20 affected by the advent of the Internet. In the Internet
    environment, the information contents may be received from any
    computer on the network, irrespective of where the subscriber
    is located. Furthermore, in the Internet environment, the
    information contents may be customized based on subscriber
25 needs and preferences.

        In all of the above-mentioned systems, including cable-
    based, satellite-based and Internet-based systems, the program
    contents also include one or more advertisements. These
    advertisements are generally inserted in the program streams by
30 evaluating the program contents, making a rough determination
    of the target audience, and finding suitable advertisements.
    For example, beer advertisements may be inserted into the
    football game programming, and gardening tool advertisements
    may be inserted into home improvement programming. In cable-
35 based and satellite-based systems, these advertisements are
    generally displayed as spot messages, and in the Internet

5   environment, these advertisements are displayed as banner
     advertisements.

          Internet environments also provide for multicasting where
     audio and video streams are simultaneously transmitted to a
     plurality of subscribers. The subscribers are grouped based on
10   the type of program contents they receive, but there is no
     distinction for the purpose of advertising.

          Thus, even though prior art advertising schemes try to
     match the program contents and the advertisements that are
     displayed within the program contents, such advertisement
15   schemes are not fully effective. What is lacking in these
     advertising schemes is the idea of targeted advertising, i.e.,
     presenting different advertisements to different subscribers
     based on one or more subscriber characteristics or different
     versions of the same advertisement to different subscribers
20   based on one or more subscriber characteristics.

                        Summary of the Invention
          The present invention is directed at an apparatus and a
     method for creating subgroups based on one or more subscriber
25   characteristics. Each subgroup corresponds to one or more
     subscribers and receives a particular program stream and one or
     more targeted advertisements directed at that set of
     subscribers.

          The subgroups may be created in many different ways. In
30   an Internet environment, the subgroups may be created by
     utilizing multicasting features. Generally, the subgroups are
     created within a multicast group based on one or more shared
     subscriber characteristics. The subgroup may comprise a group
     of subscribers, a group of households, an individual subscriber
35   or a single household. In a cable environment, the subgroups
     may be created based on the configuration of a regional head-

end and one or more local head-ends, e.g., each node configured
to a local head-end may represent a subgroup.

In another embodiment, an apparatus is presented in which
n digital program streams are received along with m digital
advertisement streams, and p digital presentation streams
containing inserted advertisements are created, where p is
greater than n. Each of the digital presentation streams
corresponds to a different subgroup, e.g., a first presentation
is transmitted to a first subgroup, and a second presentation
is transmitted to a second subgroup, etc.

In one implementation, different presentation streams are
formed for different subgroups created within a multicast
group. First, different advertisements or different versions
of the same advertisements are selected. Then a plurality of
presentation streams are created by multiplexing the program
contents with one or more targeted advertisements. These
presentation streams are then transmitted to different
subgroups. Each of the subgroups receives a presentation
stream that comprises program content and one or more targeted
advertisements. The presentation streams may be digital video
streams or digital audio streams.

Brief Description of the Drawings

The accompanying drawings, which are incorporated in and
form a part of the specification, illustrate the embodiments of
the present invention and, together with the description serve
to explain the principles of the invention.

In the drawings:

FIG. 1 illustrates the migration from broadcast and low
bandwidth unicast services to multicast and high bandwidth
services;

FIG. 2 illustrates current broadcast services and dial-up
Internet access;

FIG. 3 illustrates the formation of multicast subgroups by utilizing different routers;

FIG. 4 illustrates an exemplary case of formation of multicast groups in a cable-based network;

FIG. 5 illustrates the process of inserting targeted advertisements at a centralized point;

FIG. 6A illustrates an exemplary ad insertion multiplexer;

FIG. 6B illustrates time independent ad reception and insertion using an ad insertion multiplexer; and

FIG. 7 illustrates the migration of advertising from broadcast advertisements or advertisements in unicast IP addressed streams to multicast ads and services, and to unicast ad and unicast services.

Detailed Description
of the Preferred Embodiment

In describing a preferred embodiment of the invention illustrated in the drawings, specific terminology will be used for the sake of clarity. However, the invention is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

With reference to the drawings, in general, and FIGS. 1 through 7 in particular, the method and apparatus of the present invention is disclosed.

As illustrated in FIG. 1, the broadcast entertainment and telecommunications services are migrating from the classifications of broadcast programming and low bandwidth unicast 101 transmission to multicast and medium bandwidth unicast 103 systems in which the number of subscribers in the receiving group is reduced, or the bandwidth to a subscriber

5   receiving an individualized service is increased. This
       migration is present in traditional television broadcasting as
       well as Internet access environments.

           The increased availability of bandwidth to subscribers
       results in the formation of smaller broadcasting groups that
10   can be referred to as multicast groups. In addition, the
       amount of bandwidth available to each subscriber for unicast
       services such as connections to Web sites, high-speed point-to-
       point data connections, and videoconferencing, is increased.
       This results in medium bandwidth unicast connections that can
15   support new services.

           The increased bandwidth also enables video on demand
       services that are essentially high bandwidth unicast
       (illustrated as 105 in FIG. 1) connections providing a
       subscriber with specific programming at a specific point in the
20   program stream.

           In accordance with the principles of the present
       invention, a number of new services may also be provided based
       on these unicast connections. One of these services is the
       relay of targeted advertisements.

25   In one embodiment of the present invention, the targeted
       advertisements are relayed based on subgroups, wherein each
       subgroup may comprise one or more subscribers, or one or more
       households. The method and system for creating subgroups is
       applicable for both the television broadcasting (video
30   transmission) environment and the Internet environment, and may
       be realized in traditional networks.

           FIG. 2 illustrates exemplary illustrations for traditional
       television broadcasting and Internet access environments. The
       present broadcast audio and video entertainment services fall
35   in the category of broadcast services that are delivered by
       traditional radio, cable TV and wireless broadcasting
       techniques wherein a client (receiver) 209 receives programming

5   from a central unit 211. The central unit 211 may be a base-
    station or a head-end or a cable distribution point. In the
    Internet world, a web-server 207 broadcasts the information
    over an Internet network 205 to an Internet Service Provider
    (ISP) 203 which ultimately delivers the information to a client
10 201. The broadcasting is accomplished by utilizing one or more
    different multicasting protocols over the Internet.

    The point-to-point connection for Internet access
    illustrated in FIG. 2 is also representative of unicast
    services that can be defined as the point-to-point transmission
15 of signals from a source or a subscriber to another subscriber.
    This includes telephone service and point-to-point data
    connections to data sources.

    In accordance with the principles of the present
    invention, the actual formation of subgroups for advertising is
20 performed by creating multiple lists or tables of subscribers
    that share one or more subscriber characteristics. The
    subgroups may be based on (1) geographic segmentation, (2)
    demographic segmentation, (3) psychological segmentation, (4)
    psychographic segmentation, (5) sociocultural segmentation, (6)
25 use-related segmentation, (7) use-situation segmentation, (8)
    benefit segmentation, and (9) hybrid segmentation. More
    information may be found in a book entitled *Consumer Behavior*,
    by Leon G. Schiffman and Leslie Lazar Kanuk published by
    Prentice Hall, New Jersey 1999.

30 The analysis of different segmentations permit the
    advertisement to be directed to specific users or groups of
    users who fit certain criteria. For instance, an advertisement
    for a baby stroller could reach parents of children under five
    years old - and only those individuals in that group. Other
35 publicly or privately available data regarding the subscribers
    may also be collected. This data may also be mined to form a

5   subgroup of subscribers which has a common characteristic which
     matches the characteristics of the target group.

          One technique for forming subgroups involves utilization
     of geographic location information. Each subgroup may consist
     of subscribers located in a particular state, city, or
10   associated with a cable television node. Another technique for
     forming subgroups is based on knowledge of the viewership of
     the actual programming. For example, many companies collect
     data related to the viewing of the television programming and
     such information may be used to form subgroups. Once such
15   collection of data is known as the Nielsen rating which is
     based on samples of information related to the viewing of
     television programming. Other types of similar information are
     also available. The subgroups may be based on the actual
     viewership information, or on an estimate of the current
20   viewership, or on the statistical measurement of the
     viewership.

          The actual formation of subgroups may be accomplished in
     many different ways. In an Internet environment, the subgroups
     may be formed by utilizing multicast addresses. Currently, the
25   multicast addresses are utilized to form a group of subscribers
     that are interested in receiving the same information, e.g.,
     listening to the same radio station, being members of some
     listserv, etc. In accordance with the principles of the
     present invention, the members of a multicast group may be
30   further classified into subgroups (i.e., multicast subgroups).
     These subgroups may be formed based on geographic locations,
     e.g., country of residence, as can be determined from a
     subscriber e-mail address, IP address, or other Internet-
     related parameters. These subgroups may also be formed based on
35   a subscriber's operating system, data transmission rate, or
     other transmission related parameters. In this implementation,
     each subgroup may comprise a country, e.g., subscribers from

5   the USA may be grouped in the first subgroup, and subscribers
     from Mexico may be grouped in the second subgroup. The
     formation of subgroups based on geographic information assists
     in selecting target advertisements that are suitable for each
     group.

10   As shown in FIG. 3, in one embodiment, the multicast
     subgroups may be formed by utilizing different routers. In
     FIG. 3, a transmitter/provider of information (sender) 301 is
     directly connected to Router 1 303. The sender 301 may be a
     web-based server or a network-based server or other comparable
15   means configured to distribute information to a plurality of
     receivers 305 via one or more routers 303. As shown in FIG. 3,
     Router 1 is directly coupled to the sender 301 and thereby
     forms a multicast group. Different receivers 305 belonging to
     the multicast group of Router 1 are further distributed in
20   subgroups. Receiver 1 and Receiver 2 belong to a first subgroup
     served directly by Router 1. Receiver 3 is in a second
     subgroup served by Router 2. Receiver 4 and 5 are in a third
     subgroup and are served by Router 3. Receiver 6 and 7 are in a
     fourth subgroup and are served by Router 4.

25   Standard Internet multicasting protocols may be used to
     create these subgroups. Internet-based multicast protocols are
     well known to those skilled in the art and include Internet
     Group Management Protocol (IGMP) protocols and other
     Transmission Control Protocol/Internet Protocol (TCP/IP)
30   related protocols. Some of these multicast protocols are
     described in the book entitled Routing in the Internet authored
     by Christian Huitema, and published by Prentice-Hall in 1995,
     and in the volumes 1 and 2 of the books entitled
     Internetworking with TCP/IP, authored by Douglas E. Comer and
35   Douglas E. Comer and David L. Stevens respectively, published
     by Prentice-Hall in 1995 and 1999. The aforementioned books are
     incorporated herein by reference.

5   The Internet Engineering Task Force RFCs 1112, 1458, 1301
and 966 specify protocols for multicasting and are incorporated
herein by reference.

       Other multicasting techniques may also be used to create
lists of subscribers that form part of one or more multicast
10   groups. These groups may be subscribers in diverse locations
receiving a program stream, or may be a group of subscribers
belonging to the listserv.

       In the cable systems and satellite-based systems, the
subgroups may be created by utilizing the existing
15   configuration of cable networks. As an example, in a cable
television system, the subscribers associated with a node may
be considered to form a subgroup. As illustrated in FIG. 4, in
a traditional cable-based network 300, a regional head end 302
is coupled to one or more local ends 304. Each local end 304
20   serves one or more nodes 306. Each node 306 serves one or more
set-tops 308, and each set-top 308 in turn may serve one or
more television sets 310. In general, the viewers of the
information transmitted to the television sets are the
subscribers.

25   The subgroups may be formed utilizing the configuration of
a local head end 304, or a node 306. The nodes are preferred
because traditionally a local head end serves a large number of
viewers/households, wherein a node serves only few households
and thus may be used appropriately to form subgroups.

30   In a traditional cable-based system, a node 306 is
configured to a plurality of set-tops 308 whereby the set-tops
308 receive transmission signals from the nodes 306. These
transmission signals include programming contents as well as
advertisements. Generally, the information is delivered via
35   transmission signal to one or more set-tops 308 located within
the household, and for tracking purposes, a set-top 308

represents a subscriber. However, in actual practice, a single set-top 308 may serve one or more television sets 310.

As described before, depending on the application and the desired size of the subgroups, the subgroups may be based on the local head end 304 or may be based on the nodes 306. Alternatively, the subgroups may be narrowed and may be based upon the different set-tops 308, whereby a household represents a subgroup.

In the future, the subgroups will be further narrowed to the level of a television set 310 served from a single set-top 308. Thus, a single set-top 308 may represent a plurality of subscribers. In this case, different members of a household are different subscribers and the individual members of the household may be grouped in different subgroups for receiving different targeted advertisements. For example, the parents may receive a first target advertisement in their bedroom television, and the television in the children's bedroom may receive a second target advertisement (even though the parents and the children may be watching the same program).

The cable-based systems and satellite-based systems may further utilize cable modems or other devices configured to communicate with the Internet. For example, set-top boxes can include Data Over Cable Service Interface Specification (DOCSIS) cable modems and be assigned, and thus identified, by an IP address. The DOCSIS cable modem can receive multiple channels via this IP address.

In one embodiment, the advertisement streams (also referred as ad streams) are sent via a DOCSIS channel setup to the DOCSIS cable modem within the set-top from a Cable Modem Termination System (CMTS). The CMTS relays all ad streams transmitted by the sender. The sender obtains, from the CMTS, the IP address of the set-top box which integrates a DOCSIS cable modem and transmits the advertisements to that IP address

through the CMTS. The IP address can be part of a multicast
group or it can be a unicast address. The ad streams may be
transmitted using Internet technologies such as streaming media
or other real time protocols.

The subscriber information relating to the nodes may be
further customized/modified. For example, the addresses of the
homes served by the node may be used along with public records
to determine the average price that was paid for the home. The
public records that sufficiently provide this information
include tax records and other real estate information, e.g.,
the real estate information that associates zip codes with the
median house prices may be used to determine the median house
price of households served by a node. Other demographic
information that may be of interest includes the predominant
language which is spoken by the subscribers in the node, the
average household size for households served by the node, and
the average disposable income of households served by the node.

The present node sizes in cable television systems range
from 300 to 1,500 subscribers, but the node sizes are likely to
decrease as more bandwidth is required per home. This will
result in smaller nodes, each node being fed by a fiber-optic
cable which transmits and receives signals from the head end.
As node size is reduced the subgroup for advertising will also
be reduced, thus permitting more directed advertisements.

In cable-based systems, and in Internet-based systems,
once the target advertisements have been identified, the actual
insertion of the advertisements in the program streams may
occur at a centralized point (e.g., a server) or at a local
point (e.g., at a client end).

FIG. 5 illustrates an exemplary process of inserting
target advertisements at a centralized point. FIG. 5 is
particularly applicable in an Internet environment. As shown
in FIG. 5, there exists a plurality of target advertisements

5   502 that may have been received from many different
     advertisement servers 504. At a centralized point 506, these
     target advertisements are inserted into one or more actual
     program streams 508 to form a plurality of presentation streams
     (PS1-PS3). Each presentation stream contains a different

10   target advertisement. For exemplary purposes, it is shown that
     a sender 510 routes a first presentation stream (PS1) via one
     or more routers 512 to a first receiver, labeled Receiver 1.
     The second presentation stream (PS2) is being routed via
     another router to Receiver 2. The third presentation stream 3

15   (PS3) is routed via the use of yet another router to Receivers
     3 and 4. Additional routers may be used to form different
     subgroups and for the transmission of the advertisements to
     these subgroups.
             The process of centralized insertion is also applicable

20   for the cable-based or for the satellite-based systems. In a
     cable television environment, the routing function may be
     accomplished in the head end, instead of being accomplished in
     the routers. Similarly, the receivers shown in FIG. 5 may
     correspond to one or more geographic nodes within the cable

25   television system.
             FIG. 6A and 6B illustrate another exemplary process of
     inserting advertisements at a centralized point. This process
     may be used for cable-based systems. FIG. 6A illustrates an
     exemplary advertisement insertion system (also referred as ad

30   insertion system) 600. The ad insertion system 600 comprises
     an advertisement insertion multiplexer (also referred as ad
     insertion mux) 602, where a number of program streams (P1 - Pn)
     are received and initially decoded by demux units DC1, DC2,
     through DCn. The advertisements are labeled as AD1 - ADm and

35   are received separately. The timing modules AT1, AT2 through
     ATm are used to determine the appropriate insertion point for a
     new advertisement. The ad insertion mux 602 is responsible for

5   multiplexing the program streams with the appropriate
     advertisements and creating a plurality of presentation streams
     PS1 - PSp.

     The program streams P1 - Pn may comprise empty segments
     and the ad insertion mux 602 may insert target advertisements
10   in these segments to create various presentation streams 1
     through p. Alternatively, the program streams may contain
     original advertisements within the program contents and the ad
     insertion mux 602 may substitute the original advertisement
     with one of the selected advertisements and create presentation
15   streams 1 through p.

     Thus, one feature of the system is the ability to take n
     program streams and m advertisements and create p presentation
     streams with p being larger than n. 'This represents the fact
     that the initial program streams have been used in conjunction
20   with the multicast subgroups to create presentation streams
     with advertisements that are specifically directed at
     subgroups.

     FIG. 6B illustrates the time independent feature of the
     advertisement insertion mux 602. This feature allows
25   advertisements to be received at times not corresponding to the
     presentation times. The advertisements may be received shortly
     in advance of or well in advance of the insertion time, and may
     be stored in a temporary storage unit for insertion at a later
     time. As previously described, the advertisements may be
30   received over a low bandwidth channel such that a 30 second
     advertisement is received in a period of minutes or even
     longer. The local digital storage unit such as a magnetic
     storage unit, a magneto-optic storage unit, or an optical
     storage unit allows insertion any time subsequent to the
35   reception.

     In an exemplary case, the programming may be received at
     digital data rates in the 27-155 Mb/s range. Thus, a fiber

5   optic transmission system based on OC-3 transport rates or
     greater is used for the transport of digital video programming.
     The advertisements may be received over a lower data rate line,
     such as a T1 line operating at 1.5 Mb/s. In this example, the
     transmission of the digital video programming must occur over
10   the fiber optic transmission system (special facility), while
     the current cable television system can be used for the
     transmission of the advertisements.

          Generally, the insertion of advertisements in program
     streams is handled by a combination of cue-tone detectors,
15   switching equipment and tape players which hold the advertising
     material. Upon receipt of the cue tone, an insertion
     controller automatically turns on a tape player containing the
     advertisement. Switching equipment then switches the system
     output from the video and audio signals received from the
20   programming source to the output of the tape player. The tape
     player remains on for the duration of the advertising, after
     which the insertion controller causes the switching equipment
     to switch back to the video and audio channels of the
     programming source. When switched, these successive program
25   and advertising segments usually feed to a radio-frequency (RF)
     modulator for delivery to the subscribers.

          Many subscriber television systems, such as cable
     television systems are currently being converted to digital
     equipment. These new digital systems compress the data being
30   transmitted to subscribers using compression standards such as
     Motion Picture Experts Group 2 (MPEG-2) standard. The
     compressed advertisement data is stored as a digital file on a
     large disk drive or several drives. Upon receipt of the cue
     tone, the digital system spools ("plays") the file off of the
35   drive to a decompressor. The video and accompanying audio data
     are decompressed back to a standard video and audio, and

5   switched into the video/audio feed of the RF modulator for
     delivery to the subscriber.

          A compressed program stream, generally, is a collection of
     video, audio, and data streams which usually share a common
     time base.

10   To enable the inserting of different advertisements in
     compressed program streams, different advertising breaks or
     splice points are identified. Splice points in a compressed
     program stream provide opportunities to switch from one program
     to another. They indicate a safe place to switch, a place in

15   the bit stream, where a switch can be made, and result in good
     visual and audio quality. They are analogous to the vertical
     (blanking) interval used to switch uncompressed video. Unlike
     uncompressed video, frame boundaries in an MPEG-2 bit stream
     are not evenly spaced. Therefore, the syntax of the transport

20   packet itself is used to convey where these splice points may
     occur.

          There exists a plurality of standards in the current
     technologies that provides a description of splice points and
     other constraints for encoding and inserting in program

25   streams, e.g., MPEG-2 transport streams. In systems utilizing
     MPEG-2, the transport streams may be spliced without modifying
     the Packetized Elementary Stream (PES) packet payload. The
     systems are in compliance with existing Society of Motion
     Picture and Television Engineers (SMPTE) standards, e.g., SMPTE

30   312M-1999, and the constraints specified in the standard are
     applied individually to program streams within transport
     streams.

          Splicing of MPEG bit streams also requires managing buffer
     fullness of the decoder's buffers. When MPEG bit streams are

35   encoded, there is an inherent buffer occupancy at every point
     in time. The buffer fullness corresponds to a delay, the
     amount of time that a byte spends in the buffer. When splicing

5   two separately encoded bit streams, the delay at the splice
       point will not usually match. This mismatch in delay can cause
       the buffer to overflow or underflow at some time in the future.

              To avoid unpredictable underflows and overflows, the
       splicing method requires that the MPEG encoder match the delay
10   at splicing points to a given value. Alternatively, the syntax
       of the transport packet itself may be used to convey where
       these splicing points may occur.

              Two different types of splice points may be defined: Out
       Points and In Points. In Points are places in the bit streams
15   where it is safe to enter and start decoding that bit stream.
       Out points are places where it is safe to exit the bit stream.
       Out Points and In Points are imaginary points in the bit stream
       located between two transport stream packets. An Out Point and
       an In Point may be co-located, that is, a single packet
20   boundary may serve as both a safe place to leave a bit stream
       and a safe place to enter it.

              The SMPTE standard describes requirements for grouping In
       Points of a set of program identifier (PID) streams into
       program In Points, and for grouping Out Points of a set of PID
25   streams into program Out points which correspond in
       presentation time to the underlying data. Furthermore, because
       MPEG video and audio frames have different durations and their
       presentation times do not necessarily align, this standard
       defines exactly what it means for PID stream splice points to
30   correspond in time. More information on this standard may be
       found in a document entitled "SMPTE Standard for Television,
       Splice Points for MPEG-2 Transport Schemes", published by the
       Society of Motion Picture and Television Engineers, 595 W.
       Hartsdale Avenue, White Plains, NY 10607.
35   Thus, one object of the invention is to provide for
       efficient real-time distribution of one or more variable bit-
       rate (VBR) programs to one or more receivers. In cases where a

plurality of programs are multiplexed together and distributed
simultaneously, it is possible, in the context of the present
invention, for one or more of these programs to be encoded at a
constant bit rate (CBR). Typically, each VBR or CBR program
consists of a video stream component, one or more audio stream
components, and possibly one or more data stream components.
Each of these real-time distributed programs is hereinafter
referred to as a primary program.

It is another object of the invention to selectively
distribute advertisements in the form of auxiliary data to one
or more receivers. The auxiliary data is distributed in non-
real time using any available channel capacity, and is stored
locally at the selected receivers for real-time presentation at
a later time. In accordance with the foregoing, one aspect of
the invention comprises a method and apparatus for efficient
CBR distribution of program streams, along with advertisements
(auxiliary data) to one or more receivers. A primary data
stream, comprising at least one VBR program, and possibly one
or more CBR programs, is converted to a CBR data stream by
inserting advertisements where fill packets would have
otherwise been used to create a CBR data stream. The
distribution of the program streams and advertisements is based
on subgroups.

Furthermore, the advertisements in the form of the
auxiliary data may be differentiated from the primary programs
in that the auxiliary data need not be distributed in real
time. By doing away with the requirement for real-time or near
real-time distribution of at least a portion of the program
multiplex, it becomes easier to efficiently utilize the
available channel bandwidth.

In an exemplary embodiment of this aspect of the
invention, the program streams and the advertisements
(auxiliary data) are each assumed to be divided into segments

5   or packets. The packets of auxiliary data are inserted in
between the packets of the primary programs whenever the
distribution channel is idle for a time interval that is at
least as long as the time interval needed to transmit the next
packet of auxiliary data. In addition, MPEG-compliant program
10   map data illustrating the location of each of the primary
program or auxiliary data stream components in the multiplexed
data stream are inserted into the data stream for use at the
receivers. Such program maps are described in .sctn.2.4.4 of
the MPEG system layer documentation, ISO/IEC 13818-1.

15   In connection with the foregoing, another aspect of the
invention comprises a method and apparatus for receiving the
CBR distribution data stream at a particular receiver, and
combining selected program streams with selected advertisements
to create a customized augmented program for that particular
20   receiver. The receiver is configured with sufficient local
storage to buffer the selected advertisements until they are
needed, for insertion into the selected primary program or for
other presentations, at a later time.

     In an exemplary embodiment of this aspect of the
25   invention, a receiver program selector receives the
distribution data stream and uses a program map embedded
therein to direct program and auxiliary data multiplexers
(MUXes) to extract a selected primary program and selected
portions of the auxiliary data stream, respectively. A video
30   augmentation unit then inserts the selected auxiliary data into
the primary program stream to create an augmented primary
program which is supplied for decoding and viewing. In the
typical case, the auxiliary data comprises short program
segments including both video and audio data.

35   In this way, individual receivers which include some form
of local storage could be programmed to receive certain program
segments or certain types of program segments at any time of

5   the day. For example, all new car advertisements could be
     classified together and assigned a unique group identification
     number. If such advertisements are periodically extracted from
     an auxiliary data library and combined with the multiplexed
     primary programs prior to distribution, then the program map
10   embedded in the distribution data stream would be updated to
     reflect such additions. A receiver that has been programmed to
     receive all advertisements pertaining to new automobiles, and
     which is monitoring the received bit stream could detect such
     an advertisement by matching the relevant group classification
15   number in the embedded program table with an internal list
     representative of the types of programs which it has been
     programmed to receive. The PIDs corresponding to any
     associated audio, video, or data streams comprising the
     advertisement, could then be extracted from the distribution
20   data stream and copied to local storage for viewing at a later
     time.

          FIG. 7 illustrates the migration of services from the
     present suite of services that are transmitted as broadcast
     services with program IDs (PIDs) 902 and broadcast services
25   with IP addressing 904, to medium bandwidth services 906 which
     can include broadcast programming labeled by program
     identifiers and combined with multicast advertisements, as well
     as multicast programming with multicast advertisements. Also
     illustrated in FIG. 7 is the migration from medium bandwidth
30   services 906 to unicast services 908 including unicast
     programming and unicast advertisements. In unicast services,
     the individual advertisements are delivered directly to the
     subscriber along with the individually selected programming.

          The advertisements may be inserted into program streams to
35   create a plurality of presentation streams that are directly
     transmitted to a group of subscribers. An example of this
     embodiment is the substitution of generic advertisements in a

5   cable television system at the cable TV head end and
transmission of the new program presentation stream directly to
the subscriber. In another embodiment, an Internet sender
inserts advertisements destined for a subgroup multicast and
multicasts the new presentation stream to the subscribers in
10   that multicast subgroup. Alternatively, the program streams
may contain one or more empty segments where one or more
targeted advertisements may be inserted.

       Generally, the programming or entertainment program
streams include digital video or audio streams that contain
15   programming of interest to the subscriber. This programming may
be entertainment programming in the form of shows, news,
theatre, and movies, or may be data programming including but
not limited to stock quotes, travel information, or other types
of information that may be broadcasted to a plurality of
20   subscribers.

       Generally, the program streams are digitized and
compressed in order to be transmitted over a limited bandwidth
channel. A variety of compression schemes may be used. For
video, these techniques include the motion pictures expert
25   group (MPEG) compression standard, as well as any of the video
streaming standards used for the transmission of video over the
Internet. For audio systems, a variety of audio compression and
transmission techniques may be used including the compression
and transmission system developed by Real Networks and sold
30   under the trademark REALAUDIO, as well as other audio
compression and transmission systems available for use on the
Internet. These video and audio compression and transmission
systems allow for the incorporation of generic/default
advertisements when initially placed in the audio or video
35   stream. Once placed in the stream, a variety of techniques may
be used to detect their presence, and these generic
advertisements may be substituted with target advertisements.

The compressed audio or video streams may also contain one or more empty segments where one or more target advertisements may be inserted.

One technique that may be used to detect an advertisement break in the compressed digital stream is the placement of an audible or inaudible tone within the digital stream. This tone may be used to mark the beginning or end of the advertisement. An alternate technique is to place a known digital code in the audio or video stream that permits recognition of the advertisement. This code may indicate the duration of the advertisement. Using this technique, digital circuitry may be used to recognize the beginning of the advertisement. Other techniques are also envisioned.

Once the advertisement is located and removed from the audio or video stream, it may be necessary to "heal" the stream such that there is no disruption in the compression algorithms which may rely on information which is interspersed in the advertisement. The interspersing of information may be such that programming information is included in a digitized advertisement which will be replaced. A healing technique may be used to replace the original audio or video information and inserted advertisement, and consists of locating the information in the stream which is related to the programming and insuring that it is contained within the new advertisement that is inserted into the programming.

Although this invention has been illustrated by reference to specific embodiments, it will be apparent to those skilled in the art that various changes and modifications may be made which clearly fall within the scope of the invention. The invention is intended to be protected broadly within the spirit and scope of the appended claims.

Claims

What is claimed is:

1.   A method for presenting targeted advertisements in a telecommunications system, the method comprising:

forming a group for reception of signals from the telecommunications system;

forming a plurality of subgroups based on the group;

combining a program stream and an advertisement stream to generate a plurality of presentation streams, wherein each of the presentation streams is based on the program stream and one or more target advertisements selected from the advertisement stream;

transmitting a first presentation stream to a first subgroup; and

transmitting a second presentation stream to a second subgroup.

2.   The method of claim 1, wherein the telecommunications system is a digital telecommunications system.

3.   The method of claim 1, wherein the digital telecommunications system is a digital cable system.

5   4.   The method of claim 2, wherein the digital

telecommunications network is an Internet based system.

       5.   The method of claim 1, wherein the subgroups are

formed by using multicast addresses.

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       6.   The method of claim 5, wherein the multicast

addresses are based on Internet multicasting protocol.

       7.   The method of claim 1, wherein the subgroups are

15   based on cable nodes.

       8.   The method of claim 7, wherein data is transmitted

to the subgroups by utilizing multicast addresses based on

Internet multicasting protocol.

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       9.   The method of claim 1, wherein the first and the

second presentation streams are transmitted simultaneously.

       10.   The method of claim 1, wherein n program streams

25   are combined with m advertisement streams to generate p

presentation streams, wherein p is greater than n.

       11.   The method of claim 1, wherein the signals are

audio signals transported over an Internet protocol.

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12.   The method of claim 1, wherein the signals are
cable-based video signals.

13.   The method of claim 1, wherein the signals are
10   broadcast-based video signals.

14.   The method of claim 1, wherein the signals are
Internet-based streaming video signals.

15   15.   The method of claim 1, wherein the subgroups are
based on demographic attributes.

16.   The method of claim 1, wherein the subgroups are
based on psychographic attributes.

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17.   The method of claim 1, wherein the subgroups are
based on product and brand usage attributes.

18.   The method of claim 1, wherein said combining
25   includes multiplexing, at a centralized point, the program
stream and the one or more target advertisements selected from
the advertisement stream to generate the plurality of
presentation streams.

5   19.   The method of claim 18, wherein said multiplexing
       is performed in real-time.

       20.   The method of claim 18, wherein the selected target
       advertisements are stored temporarily in a storage medium for
10   insertion at a later time.

       21.   The method of claim 18, wherein the program stream
       includes one or more empty segments and said multiplexing
       includes inserting the selected targeted advertisements in the
15   empty segments.

       22.   The method of claim 18, wherein the program stream
       includes one or more generic advertisements and said
       multiplexing includes substituting the selected targeted
20   advertisements for the default advertisements.

       23.   The method of claim 1, wherein the one or more
       target advertisements are inserted into the program stream
       based on advertisement identifiers.
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       24.   A method for presenting targeted advertisement
       comprising:
       receiving n program streams, wherein the program streams
       include continuous programming material;

receiving *m* digital advertisement streams, wherein the advertisement streams contain advertising material; and

creating *p* presentation streams, wherein the *p* presentation streams include continuous programming and at least one of the *m* advertisements, and *p* is greater than *n*.

25. The method of claim 24, wherein the *p* presentation streams are transmitted to *p* subgroups.

26. The method of claim 25, wherein the *p* subgroups belong to a group.

27. The method of claim 25, wherein each of the *p* subgroups receives the same program stream.

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Abstract of the Disclosure

A targeted advertising system based on subgroups.
Different subgroups are formed based on one or more
10   subscriber characteristics, and different targeted
advertisements transmitted to the different subgroups.
In the Internet-environment, the subgroups are formed
by utilizing multicast addresses. In cable-based and
satellite-based systems, the subgroups are formed by
15   node configurations. The targeted advertisements are
inserted in the program streams at a centralized
distribution point such as a router or a cable
television head-end. An apparatus is presented which
receives m program streams, n advertisements, and
20   creates p presentation streams containing targeted
advertisements, where p is greater than m.

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